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IN THE APPLICATION

OF

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FOR AN

ILLUMINATED RETRACTABLE LEASH

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ILLUMINATED RETRACTABLE LEASH

## BACKGROUND OF THE INVENTION

## 1. FIELD OF THE INVENTION

The present invention relates to pet leashes, and more  
5 particularly to an illuminated, retractable pet leash.

## 2. DESCRIPTION OF THE RELATED ART

Retractable leashes for pets are well known. U.S. Patent  
Publication No. 2003/0029388, published in February 2003, and  
U.S. Patent Publication No. 2003/0145803, published in August  
10 2003, both disclose a housing having a spring-biased spooling  
assembly for automatically taking up the slack in the leash.  
Similarly, illuminated pet leashes have also been available for  
several years. Not only do they increase the safety of both the  
pet and the owner when walking at night, but also present an  
attractive ornamental appearance. In addition, retractable  
15 leashes that extend the length of the leash and then retract,  
taking up the slack as the length is shortened, have also been  
available.

U.S. Patent No. 5,967,095, issued to K. Greeves in October  
1999, discloses a leash having a relatively flat and flexible

light source provided along one side of the leash for illuminating the leash. The leash is a strap made from leather, plastic, nylon, or other similar material. The light source is preferably at least one strip of electroluminescent material 5 attached to one or both sides of the strap by C-clips, hook and loop fasteners, etc., or is embedded into the strap. The electroluminescent material is powered by a battery and inverter, the power source being either permanently or temporarily attached to the strap. A second embodiment 10 incorporates electroluminescent material to illuminate the handle portion of a leash retractor, but does not incorporate means to illuminate the leash itself. Greves does not show or suggest a retractable illuminated leash, nor does Greves show or suggest that the leash may be made from electroluminescent wire 15 itself, without a supporting strap of leather, plastic, nylon or the like.

U.S. Patent No. 4,513,692, issued to Kuhnsman et al. in April 1985, discloses an illuminated pet leash comprising a non-opaque tube that contains one or more bundles of optical fibers. 20 A light bulb is connected adjacent to the leash handle to shine light into the tube and illuminate the optical fibers in the tube.

U.S. Patent No. 4,887,552, issued to James Hayden in December 1989, discloses an electrically lighted pet leash that is composed of a transparent, flexible tube containing a string of small electric light bulbs mounted in parallel between two insulated wires. The leash is looped at one end to form a choker collar and at a second end to form a handle. The string of lights extends throughout the leash to illuminate both the collar and the handle. A small rechargeable battery is mounted adjacent to the handle for operating the lights.

U.S. Patent No. 5,850,807, issued to Russell Keeler in December 1998, discloses an illuminated leash for allowing a pet owner to easily and remotely locate the pet leash. The device includes an encoding/transmitting device for encoding and transmitting output signals, an elongated non-opaque tube having a bundle of optical fibers longitudinally disposed therein, a housing, a receiving/decoding device disposed within the housing for receiving and decoding the output signals from the transmitter and a light source disposed in the housing adjusted to illuminate the bundle of fibers.

The related art does not describe or suggest incorporating an illuminated, retractable leash within a leash retractor housing. Rather, the related art has been directed towards

illuminated handles. In addition to the '095 patent heretofore discussed, U.S. Patent No. 5,558,044, issued to Nassar, Jr. et al. in September 1996, discloses an illuminated dog leash handle and U.S. Patent No. 5,887,550, issued to Anthony H. Levine, in 5 May 1999, discloses a combined retractable pet leash and flashlight.

Although less relevant to the present invention, U.S. Patent Application No. 10/406,448, filed April 4, 2003 by G. Woodruff, discloses a portable light spool system adapted to 10 store and dispense electro-luminescent wire. The light system comprises a housing containing a rotatably mounted cylindrical hub around which the wire is wound. The cylindrical hub is hollow and is adapted to accommodate a battery and inverter. A switch disposed on the hub is operative to impress the high 15 frequency A.C. output voltage of the inverter upon the electro-luminescent wire.

None of the above inventions and patents, taken either singly or in combination, is seen to describe the instant invention as claimed. Thus an illuminated leash retractor 20 solving the aforementioned problems is desired.

## SUMMARY OF THE INVENTION

The illuminated retractable leash is a roll of electroluminescent wire mounted on a retractable reel in a handheld housing, the wire being attachable to a pet collar.

5 Included in the housing is a battery, an inverter supplying power to the electroluminescent wire and a switch to illuminate the wire.

Electroluminescent (EL-wire) is a cool to the touch, bendable, vinyl coated wire that emits a pleasant 360-degree 10 softly glowing neon light. EL-wire is a flexible wire cable having a solid copper center conductor surrounded by a material, which is luminescent in an electric field. Two thin filaments or wires, which are shorted together and helically wound around the luminescent material. The assembly is covered with one or 15 two layers of vinyl or other plastic insulating material.

When an alternating current is conducted through the center conductor and the two filaments, the alternating electromagnetic field between the conductors causes the luminescent material to glow. The color emitted by the cable may vary with the 20 frequency of the A.C. voltage or current. The brightness intensity level depends on the voltage and frequency applied to

it, and usually must exceed a minimum threshold voltage before the EL-wire will glow. The higher the voltage and frequency, the brighter the EL-wire illuminates. The present invention utilizes a DC to AC inverter designed to generate a certain voltage and frequency, optimized for a specific length of EL-wire wound on the spool.

EL technology is relatively new and only within the past few years has EL-wire become available in consumer products, specifically applications requiring lengths of glowing lights, applications which previously employed LED or other lamp technologies.

The illuminated retractable leash has an at least partially transparent housing utilizing an extendible roll of EL-wire as the leash material wound around a rotatably supported spring-biased spool or reel. Not only is the EL-wire illuminated as it extends from the housing, but by virtue of the transparent spool and housing, the housing itself is illuminated, providing a further measure of nighttime safety.

The housing includes a spring-biased spool winding and unwinding mechanism commonly found in automatic leash retractors. A battery powered DC to AC inverter circuit is mounted on a printed circuit board disposed in the housing, the

output of the circuit connected to the innermost end of the EL-wire. Operated by a housing mounted switch, the inverter provides the required electric signal to illuminate the entire length of the EL-wire. The spool is transparent, thereby allowing the EL-wire wound on the spool to illuminate the at least partially transparent leash housing.

Accordingly, it is a principal object of the invention to provide an illuminated, pet leash in a retractable handheld housing.

It is another object of the invention to provide an illuminated, retractable leash having a leash housing at least partially made of transparent plastic, whereby the housing itself is illuminated by virtue of the spool of EL-wire, thereby increasing the safety of the user when walking his or her pet at night.

It is a further object of the invention to provide improved elements and arrangements thereof for the purposes described which is inexpensive, dependable and fully effective in accomplishing its intended purposes.

These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a first embodiment of an illuminated retractable leash according to the present invention.

5 Fig. 2 is an exploded, perspective view of the illuminated retractable leash according to Fig. 1.

Fig. 3 is a side view of the illuminated retractable leash according to Fig. 1 with half of the housing removed to show the interior of the housing.

10 Fig. 4 is a representative block diagram of the illuminated retractable leash according to Fig. 1.

Fig. 5 is a perspective view of an alternate embodiment of an illuminated retractable leash according to the present invention having the battery compartment in the handle grip and 15 the inverter circuit mounted in the leash housing.

Fig. 6 is an exploded, perspective view of the illuminated retractable leash according to Fig. 5.

Fig. 7 is a side view of the illuminated retractable leash according to Fig. 5 with half of the housing removed to show the 20 interior of the housing.

Fig. 8 is a perspective view of the wire spool of the leash of Fig. 5, illustrating the conductive rings defined on the lateral surface of the spool.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 The present invention is an illuminated retractable leash, designated generally as 100 in the drawings. The retractable leash material consists of electroluminescent wire (EL-wire), which illuminates when supplied with an operative voltage supplied by a DC to AC inverter disposed in the leash housing.

10 When switched on, not only is the EL-wire visible as it extends from the housing, but by virtue of the EL-wire wound on the transparent spool, the glow from the EL-wire is visible through the transparent housing.

15 Referring first to Fig. 1, a first embodiment of the illuminated retractable leash 100 comprises an at least partially transparent plastic housing 103 having two halves 104, 104', a grip portion 114, a stop mechanism trigger 112, a battery cover 106 that snaps into the center of housing half 104, and a length of electroluminescent wire 102 extending from 20 housing 104. At least one portion 110 of each housing half 104, 104' is transparent to allow light generated from within the

housing 103 to be visible from the exterior of the retractable leash 100. The free end of the electroluminescent wire 102 is equipped with a snap hook or other connector adapted for attachment to a pet collar.

5 Leash retractor mechanisms are well known, and a mechanism similar to that disclosed in U.S. Patent Application Publication No. 2003/0029388, published in February 2003, and U.S. Patent Application Publication No. 2003/0145803, published in August 2003, the disclosure of which is hereby incorporated by reference, may be utilized to provide for extension and retraction of the electroluminescent wire 102 in the leash 100 of the present invention. As shown in Figs. 2-3, the illuminated retractable leash 100 includes a coiled spring 204 biasing a spool 202 formed of transparent plastic, around which a length of EL-wire 102 is wound. The spring 204 is received within a cavity 224 in the lateral surface of spool 202, the inner end of the spring 204 being fastened to a non-rotating portion of the housing 103, and the outer end of the spring being fastened to the rotating spool 202. When the EL-wire 102 is played out, the spool 202 rotates, increasing spring tension, whereby any slack generated in the EL-wire 102 is automatically rewound on the spool 202. A stop mechanism, not shown but

disclosed in both the incorporated '388 and '803 Patent Application Publications, is activated by a grip mounted button 112, and serves to stop the extension or winding up of the EL-wire 102 about spool 202.

5        The snap-fitting circular battery compartment cover 106, formed of molded plastic, provides a snug fit within an opening in housing half 104. Cover 106 provides access to a printed circuit board 208 mounted to the center of spool 202 by a pair of screws 214 received by a pair of bosses 212 defined within 10 the lateral side of the spool 202. The periphery of the battery cover 106, substantially thicker than the central portion 108 of the cover, has plastic tabs disposed thereon, allowing the cover 106 to snap securely in place. A rubber gasket 218, or other waterproofing seal, placed within a recess 220 defined within 15 the outer perimeter of an opening in the housing-half 104 provides a waterproof seal protecting the printed circuit board 208 disposed within.

20        With the battery cover 106 removed, a pair of batteries 210 is removably retained within battery clips 216 mounted on printed circuit board 208. The printed circuit board 208, mounted to the center of spool 202 by screws 214, contains a DC to AC inverter circuit not uncommon in the field of electronics

and is powered by the board mounted batteries 210. The batteries 210, as well as the other components deposited on the printed circuit board 208, are uniformly distributed by weight about the center of the printed circuit board 208 in order to enable the spool 202 to rotate evenly about its axis when mounted on spool hub or support 226.

A miniature push button switch 222, mounted in the center of the printed circuit board 208, operates to supply an effective voltage to the DC to AC inverter circuit. The abutment portion of switch 222 is in contact with the interior surface of the thin center portion 108 of the battery cover 106, whereby depressing the center 108 of the exterior portion of the battery cover 106 operates to illuminate or extinguish the glow from the EL-wire 102.

Fig. 4 shows a representative block diagram of the electrical circuit for the illuminated retractable leash 100 and shows at least one battery 210 supplying a DC voltage to the inverter circuit mounted on printed circuit board 208 through switch 222. The ends 206 of the EL-wire are soldered, or otherwise connected, to the output of the inverter.

Figs. 5-8 illustrate an alternate embodiment of the illuminated retractable leash 100, which removes the added mass

of the printed circuit board and batteries from the rotating spool, thereby directing the full force of the spring towards retracting the EL-wire. As with the embodiment of Figs. 1-4, the illuminated retractable leash of Figs. 5-8 contains a leash 5 housing 502 having two halves 504 and 504', transparent housing portions 506 in each half, a leash retractor mechanism including a stop mechanism and trigger 112, and a spool biasing spring 204 disposed within a recess 616 in the right lateral side 618 of transparent spool 606. However, in this second embodiment, a screw 610 or other suitable hardware secures the printed circuit board 608 to a non-rotating portion of the housing 504'. Furthermore, the "on/off" switch 508 and batteries 610 are disposed in the handgrip 514, the batteries 610 being accessible by removing battery cover 512. Similar to the previous embodiment a rubber gasket 602 or other waterproofing seal protects the printed circuit board 608 mounted inverter circuit from water damage.

Although the heretofore-mentioned embodiments have been silent as to the type of battery used to supply the power for the inverter circuit, the present invention is not limited to a specific battery technology. Lead acid, nickel-cadmium or Lithium ion batteries may be incorporated as seen fit. Should

rechargeable batteries be employed, a grip mounted external DC jack 510 as shown in Figs. 5 and 7 is provided to recharge the batteries.

In positioning the inverter circuit and battery outside of the spool 606, the difficulty to be overcome is how to deliver inverter output to the rotating ends 620 of the EL-wire 102 wound on spool 606. This problem is solved by a pair of electrical contacts 612 mounted to the inner lateral surface 506 of housing 504', connected by a pair of wires 614 to the inverter circuit on the printed circuit board 608. As best seen in Fig. 8, the inner ends 620 of the EL-wire 102 are soldered, or otherwise electrically connected to a pair of concentric electrically conductive surfaces 802 defined in the left lateral side 618' of the rotating spool 606. The housing mounted contactors 612 are so aligned to make continuous contact with the rotating conductive plates 802, thereby providing a continuous supply of alternating current to illuminate the EL-wire 102.

In conclusion, the inventor has disclosed two embodiments of an illuminated retractable leash 100, in which electroluminescent wire, serving as the leash material, illuminates both the housing and the extended leash.

It is to be understood that the present invention is not limited to the embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

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